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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/713,950

11/14/2003

David Alan Burton

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7590

06/13/2006

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EXAMINER

MEHRMANESH, ELMIRA

ART UNIT

PAPER NUMBER

2113

DATE MAILED: 06/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/713,950	BURTON ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Elmira Mehrmanesh	2113	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 November 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                                   |                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                              | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

### **DETAILED ACTION**

The application of Burton et al., for "Apparatus, system, and method for maintaining data in a storage array" filed November 14, 2003, has been examined.

Claims 1-30 are presented for examination.

Information disclosed and listed on PTO 1449 has been considered.

Claims 1-30 are rejected under 35 USC § 102.

### ***Specification***

The disclosure is objected to because of the following informalities:

Page 14 of the Specification, paragraph [0046], line 3, contains a typographical error of "malfunctioning". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Renner (U.S. Patent No. 6,243,827).

As per claim 1, Renner discloses an apparatus for maintaining data in an electronic storage array during multiple drive failures (col. 5, lines 49-51), the apparatus comprising:

a primary response module (Fig. 10 and 12) configured to recognize a failure of a first drive and enter a first operating mode in response to the failure of the first drive (col. 11, lines 31-36)

a secondary response module configured to recognize a failure of a second drive and enter a second operating mode in response to the failure of the second drive (col. 5, lines 25-50).

As per claim 2, Renner discloses the primary response module is further configured to place the first drive in an off-line state (col. 11, lines 36-40).

As per claim 3, Renner discloses the secondary response module is further configured to place the second drive in a degraded state (col. 11, lines 36-40).

As per claim 4, Renner discloses the second drive is made accessible for controlled read operations while in the degraded state (col. 10, lines 15-35).

As per claim 5, Renner discloses a pinned data module configured to store write data on a pinned data drive during employment of the second operating mode (Fig. 1, elements 60 and 61).

As per claim 6, Renner discloses the pinned data drive is a system cache of the electronic storage array (Fig. 10).

As per claim 7, Renner discloses the pinned data drive is a spare drive of the electronic storage array (Fig. 1, elements 60 and 61).

As per claim 8, Renner discloses the pinned data module is further configured to map a first data location on the pinned data drive to a second data location on another drive within the electronic storage array (col. 12, lines 21-24).

As per claim 9, Renner discloses a recovery module (Fig. 1, element 34) configured to at least partially rebuild data of the first and second drives (col. 12, lines 12-21).

As per claim 10, Renner discloses the recovery module (Fig. 1, element 34) is further configured to at least partially rebuild the data of the first drive on a spare drive of the electronic storage array (col. 12, lines 13-33).

As per claim 11, Renner discloses the recovery module (Fig. 1, element 34) is further configured to at least partially rebuild the data of the second drive using data stored on a pinned data drive (col. 12, lines 13-33).

As per claim 12, Renner discloses a tracking module configured to create a bad block table and a bad stripe table and store a bad block identifier and a bad stripe identifier in the respective tables, the bad block identifier and bad stripe identifiers identifying the location of suspect data on one of the first and second drives (Fig. 4) and (col. 7, lines 53-66).

As per claim 13, Renner discloses the tracking module is further configured to maintain the bad block identifier and the bad stripe identifier of the location of the suspect data until the data stored in the location is no longer suspect (Fig. 7 and 8).

As per claim 14, Renner discloses a system for maintaining data in an electronic storage array during multiple drive failures (col. 5, lines 49-51), the system comprising:

a storage area network (Fig. 1) having a storage controller (Fig. 1, element 30) that controls storage of network data on a plurality of storage drives (Fig. 1, elements 40-47), the plurality of storage drives forming an electronic storage array;

a primary response module (Fig. 10 and 12) configured to recognize a failure of a first drive of the plurality of storage drives and enter a first operating mode in response to the failure of the first drive and to place the first drive (col. 11, lines 31-36) in an off-line state (col. 11, lines 36-40)

a secondary response module configured to recognize a failure of a second drive of the plurality of storage drives and enter a second operating mode in response to the

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failure of the second drive (col. 5, lines 25-50) and to place the second drive in a degraded state (col. 11, lines 36-40)

a read module configured to modify a host read command to one of the plurality of storage drives during the employment of the second operating mode (Fig. 5a, 5b)

a write module configured to modify a host write command to one of the plurality of storage drives during the employment of the second operating mode (Fig. 5a, 5b)

a pinned data module configured to store write data on a pinned data drive during employment of the second operating mode (Fig. 1, elements 60, 61)

a recovery module (Fig. 1, element 34) configured to at least partially rebuild data of the first and second drives (col. 12, lines 13-33).

and a tracking module (Fig. 4) configured to create a bad block table and a bad stripe table and store a bad block identifier and a bad stripe identifier in the respective tables, the bad block identifier and bad stripe identifiers identifying the location of suspect data on one of the first and second drives (col. 7, lines 53-66).

As per claim 15, Renner discloses a process for maintaining data in an electronic storage array during multiple drive failures (col. 5, lines 49-51), the process comprising:

recognizing a failure of a first drive (Fig. 10 and 12) and entering a first operating mode in response to the failure of the first drive (col. 11, lines 31-36)

recognizing a failure of a second drive and entering a second operating mode in response to the failure of the second drive (col. 5, lines 25-50).

As per claim 16, Renner discloses entering a first operating mode further comprises placing the first drive in an off-line state (col. 11, lines 36-40).

As per claim 17, Renner discloses a computer readable storage medium comprising computer readable code configured to carry out a process for maintaining data in an electronic storage array during multiple drive failures (col. 5, lines 49-51), the process comprising:

recognizing a failure of a first drive (Fig. 10 and 12) and entering a first operating mode in response to the failure of the first drive (col. 11, lines 31-36)

recognizing a failure of a second drive and entering a second operating mode in response to the failure of the second drive (col. 5, lines 25-50).

As per claim 18, Renner discloses entering a first operating mode further comprises placing the first drive in an off-line state (col. 11, lines 36-40).

As per claim 19, Renner discloses entering the second operation mode further comprises placing the second drive in a degraded state (col. 11, lines 36-40).

As per claim 20, Renner discloses placing the second drive in a degraded state comprises making the second drive accessible for controlled read operations while in the degraded state (col. 10, lines 15-35).



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As per claim 21, Renner discloses storing write data on a pinned data drive during employment of the second operating mode (Fig. 1, elements 60 and 61).

As per claim 22, Renner discloses storage write data on a pinned data drive comprises storing data on a system cache of the electronic storage array (Fig. 10).

As per claim 23, Renner discloses storage write data on a pinned data drive comprises storing data on a spare drive of the electronic storage array (Fig. 1, elements 60 and 61).

As per claim 24, Renner discloses mapping a first data location on the pinned data drive to a second data location on another drive within the electronic storage array (col. 12, lines 21-24).

As per claim 25, Renner discloses at least partially rebuilding data of the first and second drives (col. 12, lines 12-21).

As per claim 26, Renner discloses at least partially rebuilding the data of the first drive on a spare drive of the electronic storage array (col. 12, lines 13-33).

As per claim 27, Renner discloses at least partially rebuilding the data of the second drive using data stored on a pinned data drive (col. 12, lines 13-33).

As per claim 28, Renner discloses creating a bad block table and storing a bad block identifier and a bad stripe identifier in the respective tables, the bad block identifier and bad stripe identifiers identifying the location of suspect data on one of the first and second drives (Fig. 4) and (col. 7, lines 53-66).

As per claim 29, Renner discloses marinating the bad block identifier and the bad stripe identifier of the location of the suspect data until the data stored in the location is no longer suspect (Fig. 7 and 8).

As per claim 30, Renner discloses an apparatus for maintaining data in an electronic storage array during multiple drive failures (col. 5, lines 49-51), the apparatus comprising:

means for recognizing a failure of a first drive (Fig. 10 and 12) and entering a first operating mode in response to the failure of the first drive (col. 11, lines 31-36)

means for recognizing a failure of a second drive and entering a second operating mode in response to the failure of the second drive (col. 5, lines 25-50).

### **Related Prior Art**

The following prior art is considered to be pertinent to applicant's invention, but nor relied upon for claim analysis conducted above.

Wilner (U.S. Patent No. 6,327,672), "Multiple drive failure tolerant raid system".

Jones (U.S. Patent No. 5,479,653), "Disk array apparatus and method which supports compound raid configurations and spareless hot sparing".

Kedem (U.S. Patent No. 6,154,853), "Method and apparatus for dynamic sparing in a RAID storage system".

McKean et al. (U.S. Patent No. 6,681,339), "System and method for efficient failover/failback techniques for fault-tolerant data storage system".

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elmira Mehrmanesh whose telephone number is (571) 272-5531. The examiner can normally be reached on 8-5 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert W. Beausoliel can be reached on (571) 272-3645. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

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10/12/2010